CLAIM + DETAILED DESCRIPTION

[Claim(s)]

[Claim 1]Dispersion liquid which mixed quality of synthetic tallow which has bilayer membrane organization potency, and a radical polymerization nature monomer are prepared, Or after adding said radical polymerization nature monomer to dispersion liquid which formed a bilayer membrane meeting object by making water distribute said quality of synthetic tallow, A manufacturing method of a super-thin film developing said dispersion liquid on a substrate, evaporating a solvent of said dispersion liquid, polymerizing a monomer in an obtained lamination film, and extracting said quality of synthetic tallow.

[Detailed Description of the Invention]

[Industrial Application]

This invention relates to the manufacturing method with the structure which constructed the bridge in two dimensions of a super-thin film.

[Description of the Prior Art]

As a method of manufacturing the organic thin film of a molecular level, the method by the LB method, the method of using an inorganic layer-like compound, vacuum deposition, etc. is known.

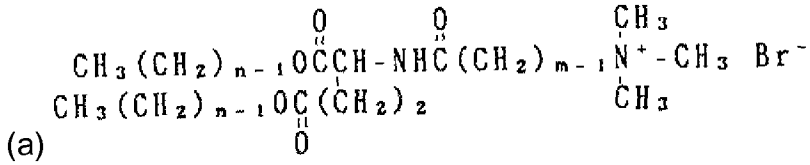
As indicated, for example in the 37-42nd pages of the "molecule design of the surface and thin film molecular design series 1 LB film" (Showa 63(1988) July 1 KYORITSU SHUPPAN Co., Ltd. issue Keiji Iriyama work), [the LB method] The monomolecular film which formed the deployment solution which dissolved in the organic solvent and prepared the predetermined compound by developing on subphases, such as water, is moved to proper substrates, such as a glass substrate. Since the hydrophilic group of a compound is arranged by the interface of a subphase at the subphase side and a molecule axis will be in the state where it gathered in

the direction of film thickness when based on this method, the obtained thin film becomes what had a regular structure with the molecular level.
As indicated, for example to "The chemicals total opinion molecular aggregate - the systematization, the structure of a function and an intercalation complex, and a function" (work besides Showa 58(1983) May 25 issue Shoji Yamanaka), [the method of using an inorganic layer-like compound] A monomer is introduced between the layers of layer compounds, such as argillite, and a monomer is polymerized between this layer.
[Problem(s) to be Solved by the Invention]
In order to move at a time one layer of monomolecular films developed on the subphase in the LB method, by the time it obtains the film thickness to need, a repetition of many processes will be needed, and productivity is bad. And the device itself is very expensive. Therefore, this method is not fit for mass production of a thin film layered product.
On the other hand, it is difficult to introduce a monomer into the big layer compound of a stratification plane product at a uniform distribution rate in the method of using an inorganic layer-like compound. And it is also very difficult to isolate the polymer obtained by polymerizing between layers. Therefore, by the time the method of using an inorganic layer-like compound is adopted widely, it will not have resulted.
When manufacturing a thin film by vacuum deposition etc., the film thickness control with a molecular level is difficult, and the device itself is expensive.
Although the **** polymerization of introducing a monomer into clathrates, such as urea and deoxycholic acid, and polymerizing as a polymerization which makes an organic matter a reaction place is known, the polymer obtained by this method is linear, and has not come to obtain a thin film.
Then, an object of this invention is to manufacture a uniform and regular super-thin film with a molecular level by forming the place for a polymerization reaction using the quality of synthetic tallow with bilayer membrane organization potency.
[The means for solving a technical problem]
In order to attain the purpose, the dispersion liquid which mixed the quality of synthetic tallow which has bilayer membrane organization potency, and a radical polymerization nature monomer are prepared, or water is made to distribute said quality of synthetic tallow in this invention.
Therefore, after adding said radical polymerization nature monomer to the dispersion liquid in which the bilayer membrane meeting object was formed, said dispersion liquid are developed on a substrate, the solvent of said dispersion liquid is evaporated, the monomer in the obtained lamination film is polymerized, and said quality of synthetic tallow is extracted.

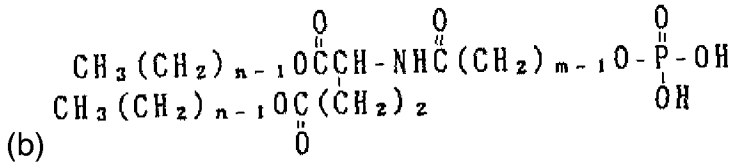
It has the ARUKIRU long-chain etc. which contains **** segments, such as the good canal

chain of ******, for example, two or more ARUKIRU long-chain, azobenzene, and biphenyl one, as quality of synthetic tallow which has bilayer membrane organization potency, And a compound with the self-organization which has hydrophilic groups, such as ammonium and phosphoric ester, is used. Self-organization here means that the compound itself forms the aggregate which has regularity under thin concentration, without adding a hand in any way from the outside.

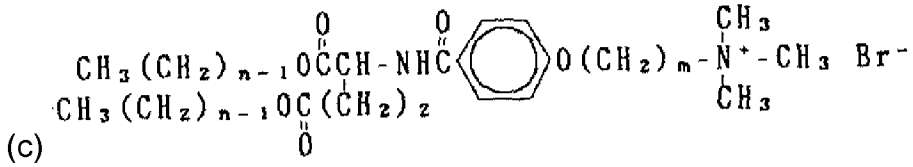
There is a compound which has the structure specifically shown by following formula (a) - (c) as this quality of synthetic tallow.



(a)



(b)

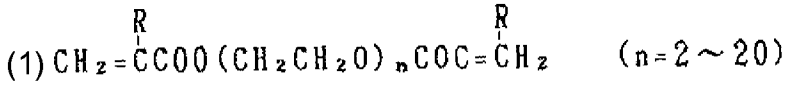


(c)

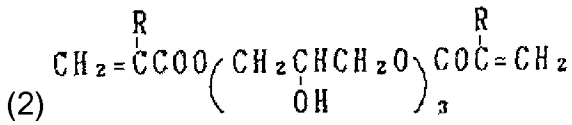
However, in formula (a) - (c), n is 11-17. On the other hand, m is 2-10 by 1-12, and a formula (c) in the formula (a) and (b).

As a radical polymerization monomer mixed with this quality of synthetic tallow, a monomer with polymerization parts, such as an acrylics machine, an methacrylic machine, a vinyl ether machine, a vinyl sulfone group, and styrene, is used.

Specifically, there is polyfunctional monomer shown by following formula (1) - (12). These monomers may use them, making several kinds copolymerize, even if independent.

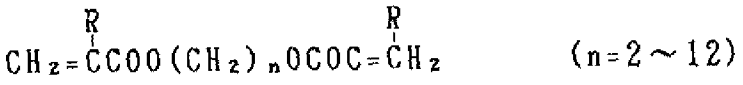


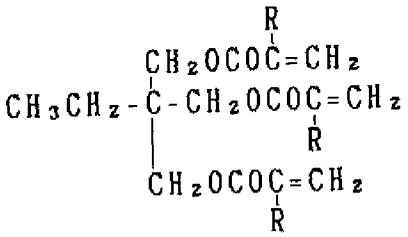
(1) (n=2～20)

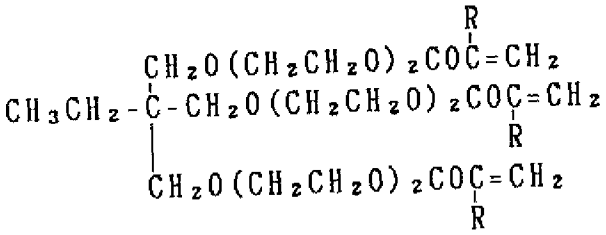


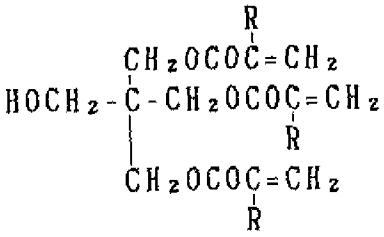
(2)

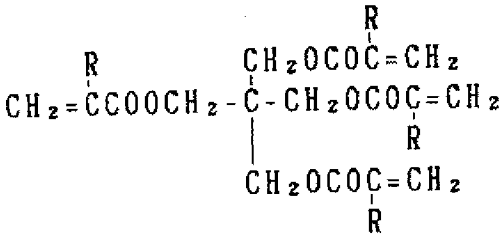
(3)

(4) 

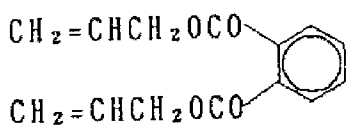
(5) 

(6) 

(7) 

(8) 

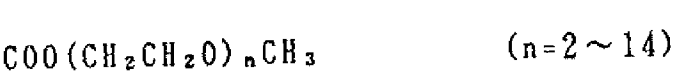
(9) CH_2=CH-O-CH=CH_2 (10) CH_2=CH-SO_2-CH=CH_2 (11) 

(12) 

(However, R in the above formula CH_3 or H)

It can also be used besides these polyfunctional monomer, making a monofunctional monomer as shown in following formula (13) - (28) able to coexist with the above-mentioned

polyfunctional monomer.

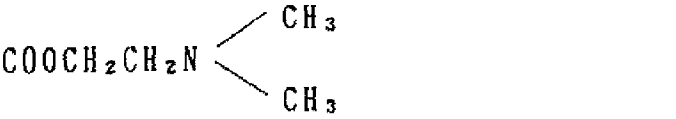
(13) 

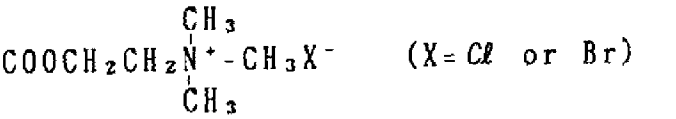
(n=2～14)

(14) 

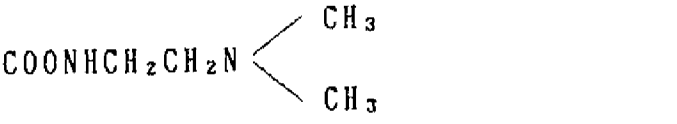
(n=2～14)

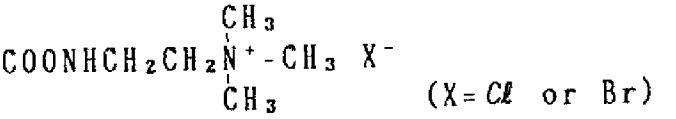
(15) 

(16) 

(17) 

(X=Cl or Br)

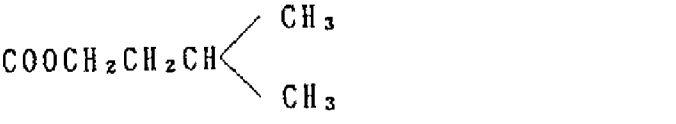
(18) 

(19) 

(X=Cl or Br)

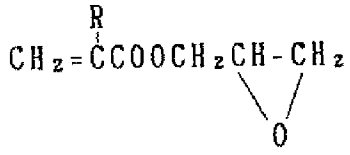
(20) 

(21) 

(22) 

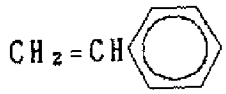
(23) 

(n=1～17)



(24)

(25)CH_2=CHCONH$_2$$CH_2$[(26)] =CHCN(27) CH_2=CHO(CH_2) $_n$$CH_3$ (n= 1-17)



(28)

(However, R in the above formula CH_3 or H)

When a film is created from a high crystalline monomer, a monomer may crystallize and it may become uneven. In such a case, the diluent which a monomer may dissolve may be made to live together. Ethylene glycol, ethylene glycol monomethyl ether, diethylene glycol, diethylene glycol monomethyl ether, diethylene glycol dimethyl ether, glycerin, etc. are one of those are used as this diluent.

[Function]

In this invention, the dispersion liquid which mixed the quality of synthetic tallow with bilayer membrane organization potency and a radical polymerization nature monomer are prepared. Or by making water distribute the quality of synthetic tallow first, the dispersion liquid in which the bilayer membrane meeting object was formed are prepared, and a radical polymerization nature monomer is added to this. A polymerization initiator may be added to these dispersion liquid.

In the solution prepared in this way, distributed voice changes with the hydrophilicity of a monomer, or how [hydrophobic]. Although Fig. 1 is a mimetic diagram at the time of using the monomer of hydrophilicity, the meeting object 2 of the quality of synthetic tallow which has bilayer membrane organization potency in the solvent 1 is distributing it.

The hydrophilic monomer 3 is also distributed uniformly.

On the other hand, when a hydrophobic monomer is used, it exists in the hydrophobic field of the bilayer membrane meeting object 2 distributed to the solvent 1 as shown in Fig. 2 with the form by which the hydrophobic monomer 4 was solubilized.

The obtained dispersion liquid are developed to substrates, such as fluoride resin and glass, and moisture of the liquid film formed on the substrate is evaporated. In order to form a uniform film by a dry state at this time, it is preferred to evaporate moisture gradually. Although this invention is not restrained, specifically, moisture is evaporated under the conditions which maintained the evaporation rate to a part for 0.7-mg/, for example in 25 ** and the atmosphere of 60% of relative humidity.

Thus, the obtained film has the structure where it was parallel and the quality of synthetic

tallow was arranged in layers to the film surface. The compound in which this has bilayer membrane organization potency is for arranging so that hydrophilic group 5 comrades may face each other as shown in Fig. 3, and the hydrophobic groups 6, such as an alkyl group, may be filled up densely. And the structure shown in Fig. 3 is maintained also within a film. This structure is proved also from the structural analysis by X-rays.

And the monomer contained in dispersion liquid is taken between the layers of this quality of synthetic tallow laminated in layers, or into the space spreading in two dimensions formed by arranging the quality of synthetic tallow in layers.

After moisture is removed, the monomer contained in the thin film polymerizes by thermal polymerization, photo polymerization, radiation initiated polymerization, etc. In order that a polymerization reaction may occur within the plane in which the monomer exists at this time, the layered product of the thin film polymer which constructed the bridge in two dimensions is obtained. By extracting the quality of synthetic tallow from this layered product by an organic solvent or ****, the super-thin film layered product which constructed the bridge is obtained. Since this super-thin film layered product has polymerized considering the stratified rule structure which the quality of synthetic tallow forms as a reaction place as mentioned above, a thickness of one layer is a super-thin film of tens of [several to] A. Even if difficult polymer has thin film-ization depending on the usual method, thin film-ization is attained by using this method and expansion of a use, improvement in functionality, etc. can be expected.

When using it as a selection demarcation membrane material taking advantage of such a feature, the thing of high permeability which can reveal a separation function by the thin film layer of an angstrom level is obtained. Since there is structural anisotropy in the direction of film thickness, and the direction of a film surface when using it as an electric conduction object, a thing with the function in which the mobility of a carrier can be changed greatly is obtained. As an organic layer-like compound, a functional molecule is made to take in between layers and there is also a use as a functional composite material which had the feature optically, electrically, and magnetically.

[Example]

- Mix 2-mol% of 4 (2-hydroxy ethoxy) phenyl (2-hydroxy 2-propyl) ketone to a monomer as the quality of embodiment 1-several-kinds synthetic tallow, a radical polymerization nature monomer, and a polymerization initiator, and dispersion liquid are prepared, These dispersion liquid were developed on the glass substrate, and the 3-mm-thick liquid film was formed. Subsequently, after removing moisture from a liquid film with 0.7-mg the evaporation rate for /, the ultraviolet exposure was carried out with the ultra-high pressure mercury lamp, and the bridge construction polymerization of the monomer was carried out. And it was immersed in methanol with a temperature of 20 **, the quality of synthetic tallow was extracted, and the super-thin film layered product was manufactured.

The 1st table shows the combination of the quality of synthetic tallow, and a radical polymerization nature monomer. The kind of the quality of synthetic tallow in the 1st table and radical polymerization nature monomer shows a compound with the structure of (a) - (c) and (1) - (28) mentioned above, and the variance shows the quantity applied to water 1**.

第１表　合成脂質とモノマーとの組合せ

試験 No.	合成脂質 分散量 g／ℓ	モノマー 分散量 g／ℓ
1	(a) n＝15, m＝10 13.5	(1) n＝14, R＝H 11.1
2	〃	(1) R＝H 5.2
3	〃	(3) 2.3
4	(b) n＝13, m＝10 12.1	(1) n＝14, R＝H 11.1
5	〃	(2) R＝H 5.2
6	〃	(3) 2.3
7	(c) n＝11, m＝4 12.1	(1) n＝14, R＝H 11.1
8	〃	(2) R＝H 5.2
9	〃	(3) 2.3

試験 No.	合成脂質 分散量 g／ℓ	モノマー 分散量 g／ℓ
10	(a) n=13, m=10 12.7	(4) n=6 , R=H 3.3
11	〃	(5) R=H 4.5
12	〃	(6) R=H 8.4
13	(b) n=11, m=10 11.2	(7) R=H 4.5
14	〃	(8) R=H 5.3
15	〃	(9) 1.1
16	(c) n=11, m=10 13.2	(10) 1.8
17	〃	(11) 2.0
18	〃	(12) 3.7
19	(a) n=15, m=10 13.5	(1) n=14, R=H 5.6 (13) n=4 , R=H 2.0
20	(b) n=11, m=10 11.2	(1) R=H 2.6 (14) n=9 , R=H 3.5
21	(c) n=13, m=4 13.2	(3) 0.6 (25) 1.1
22	(a) n=15, m=10 13.5	(5) R=H 1.5 (27) n=5 1.9

- The dispersion liquid which made water distribute the quality of embodiment 2-several-kinds synthetic tallow, and formed the bilayer membrane were prepared. As shown [these dispersion liquid] in the 3rd table, after adding 2-mol% of 4 (2-hydroxy ethoxy) phenyl (2-hydroxy 2-propyl) ketone to a monomer as a radical polymerization nature monomer and a polymerization initiator, it developed on the surface of the glass substrate, and the 3-mm-thick liquid film was made. To this liquid film, moisture removal, polymerization of a monomer, and extraction of the quality of synthetic tallow were performed like Embodiment 1, and the super-thin film was manufactured.

The 2nd table shows the quality of synthetic tallow at this time, and the combination of a radical polymerization nature monomer.

第２表　合成脂質とモノマーとの組合せ

試験No.	合成脂質 分散量 g／ℓ	モノマー 分散量 g／ℓ
1	(a) n＝15, m＝10 13.5	(1) n＝14, R＝H 11.1
2	〃	(3) 2.3

試験No.	合成脂質 分散量 g／ℓ	モノマー 分散量 g／ℓ
3	(b) n＝13, m＝10 12.1	(1) n＝14, R＝H 11.1
4	〃	(3) 2.3
5	(c) n＝11, m＝4 11.9	(1) n＝14, R＝H 11.1
6	〃	(3) 2.3
7	(a) n＝15, m＝10 13.5	(1) n＝9, R＝H 4.2 (14) n＝9 , R＝H 3.5
8	(b) n＝13, m＝4 12.7	(1) n＝14, R＝H 5.6 (16) 1.5

In the above Embodiments 1 and 2, the thin film polymer which constructed the bridge in two dimensions [versatility] was obtained. All were very difficult although film-ization was tried by performing a bridge construction polymerization for (2), (3), (5), (7), and (8) independently among the monomers used in these examples, respectively. and -- even if it holds the shape of a film in the state where a crack goes into the obtained film after a polymerization, or it is attached to the substrate -- a film -- if independent, it was in the state which cannot be treated very easily.

Next, by polymerizing a monomer independent cast film, as compared with the super-thin film layered product created by examination No.1 of Embodiment 1, dynamic physical properties are measured and the result is shown in the 3rd table about (1) from which a film is obtained, and (n= 14, R=H).

第３表　フィルムの力学的物性

	実施例	比較例
引張り強度 (kg／㎟)	0.6	0.2
弾性率 (kg／㎟)	1.8	1.9
伸び率 (%)	48	11

The super-thin film layered products created by examination No.1 of Embodiment 1 from the 3rd table are one 3 times the intensity of this, and a little less than 5-time pace of expansion compared with the monomer independent polymerization film of a comparative example.
It turns out that tough nature is very high.
This shows reason **** to that bridge construction just advances in two dimensions. That is, it excels also in kinetic property besides the structural feature, and is very useful as a material used in various fields.
[Effect of the Invention]
As explained above, in this invention, the reaction place of a radical polymerization is made qualitatively [of synthetic tallow] with bilayer membrane organization potency, and the bridge construction polymerization of the monomer is carried out in two dimensions at the reaction place. Therefore, the obtained thin film becomes a very thin thing with thin [of the molecular level]. And the polymerization spreads in two dimensions. Therefore, the super-thin film manufactured by this invention is used as a useful material in various fields, such as a demarcation membrane, an ion-exchange membrane, a solid electrolyte, and an organic layer-like compound, taking advantage of the characteristic structure.

[Translation done.]